



Authors

Polasa K. Kumar P U. Krishnaswamy K.

Institution: Natl. Inst. Nutr., Indian Council Med. Res., Jamai Osmania PO, Hyderabad
500 007, IND.

Title Effect of Brassica nigra on benzo(a)pyrene mutagenicity.

Source

Food & Chemical Toxicology 32 (8). 1994. 777-781.

Keywords

RESEARCH ARTICLE. BRASSICA NIGRA. PLANT. RAT. MAMMAL. DIETS. MUSTARD
SEED. CANCER. CARCINOGEN. MUTAGEN. FOOD. DIETS. DOSES. METABOLITES.
ENVIRONMENT. TOXICITY.

Abstract

Male rats were given diets containing Brassica nigra (mustard seed) powder at 0, 1, 5 or 10% for 1 month and then exposed to benzo(a)pyrene (B(a)P (1mg by ip injection). The antimutagenic effect due to mustard was assessed by testing the urine of rats fed diets with and without mustard. There was a significant (P lt 0.001) reduction in reversion frequency of the TA98 and TA 100 strains of Salmonella typhimurium in mustard-fed groups. This protective effect was seen with all three doses of mustard. The study demonstrated that mustard (Brassica nigra) can be a potent antagonist of the adverse biological effects of the ultimate metabolites of B(a)P, a ubiquitous environmental genotoxicant.

Title

Cancer preventive properties of varieties of Brassica oleracea: A review.

Source

[American Journal of Clinical Nutrition 59 (5 Suppl.). 1994. 1166s-1170s.]

Keywords

LITERATURE REVIEW. BRASSICA OLERACEA. HUMAN. CABBAGE. BROCCOLI.
BRUSSEL SPROUTS. PROPHYLACTIC DIET. EPIDEMIOLOGY.

Concept Codes

*Nutrition/Prophylactic and Therapeutic Diets [13218]

*Neoplasms and Neoplastic Agents/Pathology; Clinical Aspects; Systemic
Effects [24004]

*Public Health: Epidemiology/Organic Diseases and Neoplasms [37054]

Behavioral Biology/Human Behavior [07004]

Biosystematic Codes/Super Taxa

Hominidae [86215]

Animals. Chordates. Vertebrates. Mammals. Primates. Humans.

Abstract

Cabbage, broccoli, Brussels sprouts, and other members of the genus Brassica have been widely regarded as potentially cancer preventative. This view is often based on both experimental testing of crude extracts and epidemiological data. The experimental evidence that provides support for this possibility is reviewed for the commonly consumed varieties of Brassica oleracea. In a majority of cases the biological activities seen in testing crude extracts may be directly related to specific chemicals that have been reported to be isolated from one of these closely related species, thus the chemical evidence further supports the data from testing extracts and epidemiology.

CLM What is claimed is:
 1. A compound of formula ##SPC18## wherein R.sup.1 and R.sup.2 are methyl or ethyl; X and X' are bromo, chloro or fluoro; Y is hydrogen, bromo or chloro; and

4. A compound according to claim 1 which is 2-(3,5-dichlorophenyl)-4,4-dimethyl-5-chloro-5-dichloromethyloxazoline and

5. A compound according to claim 1 which is 2-(3,5-dichlorophenyl)-4,4-dimethyl-5-bromo-5-dibromomethyloxazoline and its hydrobromide.

INCL INCLM: 260/307.000F

NCL NCLM: 548/237.000

IC [1]

ICM: C07D085-36

EXF 260/307F

ARTU 122

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L38 ANSWER 31 OF 32 COPYRIGHT 1995 EPO
 AN 9053660 INPADOC UP 880412
 TI BAG FOR PRESERVING BROCCOLI SPROUTS.
 IN ARIMORI KENJIROU
 INS ARIMORI KENJIROU
 PA KURARE CHEMICAL KK
 PAS KURARE CHEMICAL KK
 DT Patent
 PIT JPA2 DOCUMENT LAID OPEN TO PUBLIC INSPECTION
 PI [JP 60094056] A2 850527
 AI JP 83-201437 A 831027
 PRAI JP 83-201437 A 831027
 OSCA 103:161525
 OSDW 85-162814
 OSJP 090237C000002
 IC ICM (4) A23B007-144
 ICS (4) A23B007-00

L38 ANSWER 32 OF 32 COPYRIGHT 1995 JPO and Japio
 AN 85-094056 JAPIO
 TI BAG FOR PRESERVING ***BROCCOLI*** ***SPROUTS***
 IN ARIMORI KENJIRO
 PA KURARAY CHEM KK, JP (CO 423550)
 PI JP 60094056 A 19850527 Showa
 AI JP 83-201437 (JP58201437 Showa) 19831027
 SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C,
 Sect. No. 305, Vol. 9, No. 2371, P. 2 (19850924)
 IC ICM (4) A23B007-144
 ICS (4) A23B007-00
 CC 11.4 AGRICULTURE, FORESTRY, AND FISHERY - Food products
 14.5 ORGANIC CHEMISTRY - Microorganism industry
 31.2 PACKING - Container
 AB PURPOSE: A broccoli sprout product preserved in bag capable of
 preserving freshness for a long period, obtained by sealing up

broccoli ***sprouts*** and a specific adsorbent
hermetically within a bag of polyolefin polymer.
CONSTITUTION: An adsorbent (slaked lime may be additionally used)
obtained by adding about 40-60wt% active carbon of coconut shell
flour having high activity (specific surface area: about
1,500-1,700m²/g, particle size: passing through about 100 mesh) to a
sheet of polyether or polyester urethane foam is used. Namely,
broccoli ***sprouts*** and the adsorbent are sealed up
hermetically in a package bag of a film (thickness: 15-50.mu.) of a
polymer selected from polyethylene, polypropylene, polybutadiene,
and ethylene-vinyl acetate copolymer.

dominating the oval shape and range sizes of 1-5u. % amylose content was 35.6, with slightly lower gelatinization temperature and viscosity relatively higher than expected. Starch from faba beans showed certain characteristics which explains its potential functional properties and make it different from other legume grains.

124

Characterization of carbohydrates in *L. albus*. Abdellatif Mohamed and Patricia Rayas-Duarte, Department of Cereal Science, North Dakota State University, Fargo, ND 58105

L. albus cultivar grown in California was analyzed for the carbohydrates composition of hull and cotyledon. Proximate analysis showed that this cultivar contains 38% proteins, 48% carbohydrates (3% starch, 5.3% oligosaccharides, 39.7% polysaccharides), 10% oil and 3% ash. The hull consists of 19.7% cellulose, 7.9% oxalate soluble, 43.8% hemicellulose-A, 27.0% hemicellulose-B, and 1.6 water soluble, all expressed in dry basis. Arabinose and glucose, arabinose and galactose, xylose and glucose, xylose and glucose were the dominant sugars in cellulose, oxalate soluble, hemicellulose-A and hemicellulose-B fractions of the hull, respectively. Arabinose and galactose, galactose and mannose were the dominant sugars in the cotyledon's water insoluble and water soluble fractions, respectively. The oligosaccharide content was 5.3% with 3.1% verbascose + stachyose. No free sugars were detected except for a trace of fructose. The total dietary fiber content was 33.8% with 14% soluble fiber, 12% uronic acid and 0.03% phytic acid.

125

Effect of Broken Corn on Steepwater Characteristics. D. Wang and S.R. Eckhoff, Department of Agricultural Engineering, University of Illinois, Urbana, IL 61801

Broken corn was added back at levels of 1.4, 8.12 or 16% by weight to whole kernels of three hybrids: FR27*FRM017 (soft), FR618*FR600 (Medium Hard), and FR618*H123 (Hard). The samples had been dried either at ambient conditions or at 110°C. Samples were steeped for 36 hours at 52°C in 0.15% sulfur dioxide and 0.5%

lactic acid and the steepwater characteristics were monitored. The rate of water absorption by the whole kernels and the steepwater pH were not affected by the presence of broken corn, although there were difference in these characteristics based upon hybrid. The solid contents of the steepwater and the protein content of the steepwater increased linearly with the percent of broken corn in the samples. FR618*FR600 and FR27*FRM017 released higher levels of solubles and had higher steepwater protein. Smaller broken corn particle size also increased the levels of steepwater solubles and protein content. Higher steepwater soluble and protein levels resulted from steeping ambient air dried corn as compared to high temperature dried corn.

126

Should RVA Cans be Reused? J. L. Hazelton and C. E. Walker, Department of Grain Science and Industry, Kansas State University Manhattan, KS 66506-2201.

The RVA functions by measuring the change in viscosity of a heating sample. Current RVA design employs a single use can which is distorted during the clamping cycle. Can reuse is not recommended because the cans might have different heat transfer properties. The objective of this work was to observe the effects of reusing the cans to see if the analytical results changed. For the 3 minute test, there was a definite trend for the time to peak and the end-time viscosity to increase, but the peak viscosity decreased, when the cans were randomly placed. For the 18 minute pasting curve tests, all viscosity and time values were higher for the reused cans than for the single use cans. The values tended to increase with each additional reuse.

127

Protective Effect of Cruciferous Seed Meals Against Mouse Colon Cancer. J. E. Barrett, C.F. Klopfenstein,

Dept. Grain Science, KS State Univ., Manhattan, KS 66506; H. W. Leibold, School of Veterinary Medicine, KS State Univ., Manhattan, KS 66506.

Tumor occurrence and growth can be inhibited by some chemical compounds found in food. Glucosinolate-rich cauliflower, cabbage, broccoli, and other cruciferous vegetables have been associated with low cancer incidence. Little research has addressed the anticancer role of cruciferous oilseed meals, such as rapeseed and canola. In this study, mice were fed diets containing oilseed meals or seed fractions and were injected weekly with 1,2-dimethyl hydrazine dihydrochloride, a known colon carcinogen. Experimental diets contained defatted canola, crambe or rapeseed meals, or crambe hulls. Following the 20-week initiation period, necropsy data indicated that mice fed the experimental diets had fewer tumors than those fed the soybean meal control diet. Statistically significant differences in tumor incidence occurred among animals fed rapeseed and crambe diets compared with results from all other diets. Preliminary results indicate dietary cruciferous meals have a protective effect against colon cancer in mice. Potential protective agents will be identified.

128

Nutrient Contents of Fermented Corn Doughs. K. Addo, Department of Nutrition and Food Science, University of Kentucky, 219 Funkhouser Bldg., Lexington, KY 40506-0054.

Cooked, naturally-fermented corn dough, with its characteristic aroma, taste and shelf-life extension properties, is widely consumed in different forms in several African and Latin American countries.

Changes in nutrient content of corn dough during fermentation and after cooking are investigated. Differences in protein digestibility and other nutrient properties between non-fermented and fermented, and between uncooked and cooked corn doughs are reported.

129

Preparation of Nutritionally Rich Rice Based Products Supplemented with Treated Soybean Flour. Y. S.

B1

SPROUTS

To Grow and Eat

Esther Munroe

THE STEPHEN GREENE PRESS
BRATTLEBORO, VERMONT

PUBLISHED DECEMBER 1974
Second printing December 1977—20,000 books in print

Copyright © 1974 by Esther Munroe

All rights reserved. No part of this book may be reproduced without written permission from the publisher, except by a reviewer who may quote brief passages or reproduce illustrations in a review; nor may any part of this book be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopying, recording, or other, without written permission from the publisher.

This book has been produced in the United States of America. It is composed by Priscilla Richardson and is published by The Stephen Greene Press, Brattleboro, Vermont, 05301.

The photographs for this book are by Allan Seymour.

Munroe, Esther, 1923—
Sprouts to grow and eat.
Includes index.

1. Cookery (Sprouts) I. Title.
TX801.M87 641.6'3 74-23609
ISBN 0-8289-0226-7

Contents

Practical Metric Conversions	vi
Sprouts—A Food Bargain	1
Getting Your Seeds	5
Which Sprouts for What	7
Sprouting Your Seeds	20
Quick-Reference Sprouting Chart	30
Recipes	33
Appetizers	33
Soups	42
Salads	50
Main Dishes	63
Vegetables	83
Breads	91
Sweet Things	100
Beverages	104
Breakfast Dishes	107
Baby Foods	111
Supplier's List	117
Index	119

2 / Sprouts—A Food Bargain

present population exchanged one-third of its meat product intake for seeds.

As the world's population increases, the need for more foodstuffs also increases. To help meet this problem, it is already apparent to many authorities that more seeds will have to be used in some form for human food. Since 3000 B.C. the Chinese have recognized that sprouted seeds provide greater nutrition than just seeds alone. Sprouted rice, bean and pea seeds have played an important role in the Chinese diet. Several centuries ago the Russians started adding sprouted wheat to their black bread, recognizing that this gave them greatly increased nutrition, particularly, as we now know, Vitamin C.

Nutritional Advantages

It is really only in the past thirty years that we here in the Western hemisphere have become interested in sprouts and sprouting. During World War II considerable interest in sprouts was sparked in the United States by an article written by Dr. Clive M. McKay, Professor of Nutrition at Cornell University. Dr. McKay led off with this dramatic announcement: "Wanted! A vegetable that will grow in any climate, will rival meat in nutritive value, will mature in 3 to 5 days, may be planted any day of the year, will require neither soil nor sunshine, will rival tomatoes in Vitamin C, will be free of waste in preparation and can be cooked with as little fuel and as quickly as a . . . chop."

Dr. McKay was talking about soybean sprouts. He and a team of nutritionists had spent years researching the amazing properties of sprouted soybeans. They and other researchers at the universities of Pennsylvania and Minnesota, Yale and McGill have found that sprouts retain the B-complex vitamins present in the original seed, and show a big jump in Vitamin A and an almost unbelievable amount of Vitamin C over that present in unsprouted seeds. While some nutritionists point out that this high vitamin content is gained at the expense of some protein loss, the figures are impressive: an average 300 percent increase in Vitamin A and a 500 to 600 percent increase in Vitamin C. As a result, one-half cup of almost any sprouted seed provides as much Vitamin C as six glasses of orange juice. In addition, in the sprouting process starches are converted to simple sugars, thus making sprouts easily digested.

A Great Variety / 3

Other Advantages

There are many advantages beyond the nutritional advantages to be gained from using sprouts in the family diet.

Sprouts can be grown just about anywhere. All that is required are seeds, very simple equipment and small amounts of water.

The yield of sprouts to original seed is about 4 to 1; for example, 1 cup of wheat will make about 1 quart of wheat sprouts. This makes storage of enough seed for a large and varied sprout harvest possible in limited space.

Sprouts can be used in place of, or in conjunction with, other fresh vegetables, thus providing appetizing top-quality, garden-fresh vegetables when the market variety are either inferior in quality or very expensive. It should be pointed out that seeds for sprouting are not cheap (*they must be untreated by the various chemicals that many seed producers use and certified edible*); yet no foodstuff is cheap any longer and the cost of seeds for sprouting is still very low in relation to the edible yield.

Not the least of the advantages to incorporating sprouts in the diet is that they add a wonderful variety of textures and flavors.

Warning—only chemically untreated and certified edible seeds should be used for sprouting.

The Wonderful Variety

Most people are familiar with the mung bean sprouts that are used in Chinese food, but many have never heard about sprouting any other kind of seed. They ask, "Do they all taste alike?" The answer is that they don't taste any more alike than the different plants from which they derive.

Seeds from almost every vegetable commonly grown in North America can be sprouted and used for human food with great nutritional advantage. There are two common vegetables that do not produce edible sprouts: *tomato* and *potato* sprouts are highly poisonous and should never be eaten.

Wheat and rice sprouts have a sweet nut-like flavor; alfalfa, rye and clover sprouts have a fresh-green taste not unlike that of other salad greens; radish and mustard sprouts are somewhat peppery and should be used in conjunction with more bland foods; sprouts from seeds of the cabbage family—broccoli, Brussels sprouts, cauliflower and cabbage itself—taste rather like the parent plants; sprouts from each one of the many kinds of peas, beans and lentils have their own distinctive tastes and are particularly versatile in cooking.

For greatest food value, all of the edible sprouts may be eaten raw. All may also be cooked in many different ways, which are covered in the recipe section of this book. If sprouts are new to you and your family, it is suggested that you try several different kinds, both raw and cooked. You are certain to find some, and perhaps many, that you enjoy.

Anyone who likes vegetables—either raw or cooked—will find a whole new world of taste treats in sprouts. If you are careful not to mention the “this is good for you” aspect, most children will also like many sprouts.

Warning—only chemically untreated
and certified edible seeds should be
used for sprouting.

Getting Your Seeds

As mentioned earlier and as most home gardeners are already well aware, by far and away the largest percentage of seeds sold for planting have been treated with some chemical or other—the list is long and constantly changing. These chemicals are chiefly pesticides used to protect the seeds from various infestations. However, in some cases, for instance alfalfa and red clover, methyl dyes are used to indicate foreign origin. The latter, and many of the former, are highly toxic to human beings and, to make matters worse, accurate warnings are not always required to appear on the packaging. As a result, for safety's sake, *sprouts from seeds that have been treated with any chemical whatsoever have to be considered not fit for human consumption.*

One way to get seeds for sprouting is through the mail. A number of mail-order seed companies do sell a selection of untreated seeds. At the end of this book there is a partial list of such suppliers. However, to be on the safe side, always specify when ordering that you want only untreated seeds—seeds completely free of chemicals, and certified edible. And be sure to double check when your seeds arrive. This is more than worth the little effort involved.

Since more people have become interested in natural and/or untreated foods, many health food stores have begun to stock untreated seeds that are suitable for sprouting. If there is no natural food store available in your area, you may wish to consult the list of suppliers at the back of the book for the names of health food supply houses from whom you can order by mail. Once again, be sure to specify that you want untreated, edible seeds suitable for sprouting.

Most stores that specialize in Oriental foods also sell seeds for sprouting—particularly mung bean and soybeans, both of which are widely used in Far Eastern dishes.

6 / Getting Your Seeds

In addition, many chain stores and supermarkets, as well as the corner market, sell brown rice, whole peas, beans and lentils of various kinds that are perfectly safe for sprouting. These seeds can sometimes be used successfully, although they are often not as satisfactory as those intended primarily for sprouting. They may well contain among them cracked or broken or too-old seeds that will not sprout. However, it is worth a try, especially if you can find a small store that doesn't treat its stock too roughly.

Anyone who lives in a rural area may be able to get some untreated seeds from the local grain dealer. Here again it is essential to be sure that the seeds are suitable for *human* consumption.

For the home gardener there is yet another alternative. Even though you cannot eat treated seeds, it is possible to plant those seeds to grow a crop of your own seeds that are safe to eat. Just select a few plants that seem particularly suitable and allow them to go to seed. Use no chemicals on the plants. Pick the seeds when they are fully mature, dry them completely and store in closed containers in a cool, dry, dark place. You then have your own untreated, fully wholesome seeds for sprouting—at almost no cost.

Warning—only chemically untreated and certified edible seeds should be used for sprouting.

2-H9

Which Sprouts for What

Before going into the particulars about each sprout, there are a few generalities to bear in mind. Sprouts are always tastiest when young and fresh (in fact, they should rarely be allowed to reach over 1 inch in length). So it is best to sprout only a limited number of each variety at a time and to try to plan to have one crop eaten before the next harvest is ready.

Following is an alphabetical listing of the most commonly sprouted seeds, offering in a nutshell the specifics of recommended sprout length and sprouting time, plus general suggestions for use, for each sprout. Also see the "quick reference" table placed for convenience just before the recipe section. This table gives seed quantities and their expected sprout yield, plus handy information on growing and cooking (if any) times.

Once again, it is important to remember that the sprouting times given here are average times and may vary with the age of the seed, its moisture content and with the humidity and room temperature (some people feel that even the content of the water used affects the sprouting process). As a result, do not be bound by the exact times listed but rather by the length of the sprouts, being sure to harvest them before they pass their peak.

ADZUKI BEAN. These tiny red-brown beans are not as well known in the Western world as they deserve to be. In the Orient they have been grown for centuries and are often used in dishes for festive occasions. Easy to sprout, they are ready to eat in 4 or 5 days, at a sprouted length of $\frac{1}{2}$ to 1 inch. Use adzuki bean sprouts in any recipe that calls for mung bean, soybean or any other legume sprouts.

8 / Which Sprouts for What

ALFALFA. The name for this forage crop is Arabic, meaning "a fine, green fodder" and it derives from the fact that the Arabs discovered their horses grew stronger and more fleet on this crop than on any other. Sprouted for only 1 or 2 days, to a sprout length of 1/8 inch, alfalfa sprouts are particularly good in pastries, cereals and appetizers. If the sprouts are grown 4 or 5 days to about 1 inch and exposed to sunlight for a few hours, which allows them to develop chlorophyll, they make a delicious addition to fresh green salads. Alfalfa is one of the easiest of all seeds to sprout and, while the seed is fairly expensive, the yield is high, so the resulting crop of sprouts is quite reasonable in price.

ALMOND. Unhulled almonds are not easy to find but, if you do locate some in a health or Oriental food store, they are delicious sprouted and used as you would any nut meat. Soak for twice as long as other seeds—about 24 hours, rinse often and keep quite wet. A sprouting time of 3 to 5 days will give you 1/8 to 1/4 inch sprouts, which are just right for use.

BARLEY. This is one of the oldest of all known grains, its origin is lost in man's own prehistoric beginnings. Barley formed a part of the religious rites for many Old World peoples. Once a mainstay in bread making, its use today is largely confined to the brewing of alcoholic beverages and to livestock feed. However, barley sprouts have a fine nut-like flavor that makes them suitable for use anywhere you would use wheat, oats or rice—particularly in breads, soups and casserole dishes. Treat as you would wheat, oats or millet sprouts. Sprouting time is 3 to 5 days; use when sprouted length is no longer than the seed.

BEANS—Black, Broad, Fava, Kidney, Lima, Navy, Pea, Pinto and Red (see also **MUNG BEANS** and **SOYBEANS**). The bean kingdom is one of the most varied in the plant world and beans range in size from limas and kidneys, which are nearly an inch long, to pea beans, no more than 3/8 inch long. Almost every country has some traditional dish made with beans and, by the same token, all have their body of folklore about beans, even to the extent of thinking of them as unlucky. Under most conditions the bean is a prolific producer and the peoples of

Which Sprouts for What / 9

South America and the Orient still rely on beans as a staple item of diet. Sprouted beans lose the gas-producing quality of the unsprouted bean and become readily digestible. Each variety of bean sprout has a distinctive taste and all are most adaptable to every kind of use—in appetizers, breads, drinks, main dishes, salads and soup. Most of the bean sprouts listed here are as good raw as they are cooked. Sprouting time for most beans is 3 to 5 days and sprouted length should be 1/2 to 1 1/2 inches, depending on the bean. A good rule of thumb for beans is "the larger the bean, the shorter the sprout." Larger bean sprouts tend to be tougher and smaller ones more tender, so try different lengths for each bean and select the length and flavor you prefer.

BROCCOLI see **CABBAGE FAMILY**

BRUSSELS SPROUTS see **CABBAGE FAMILY**

BUCKWHEAT. Buckwheat is one of the fastest growing of all grain or cereal crops. For centuries it was used throughout Russia, Manchuria and Europe in bread making. It is less extensively grown in the United States than in the past, which is unfortunate because it is almost totally free of disease or blight. Most of the American crop is used in pancake flours and livestock feed, while buckwheat honey is relished for its distinctive taste and dark color. Buckwheat kernels tend to stick together, so rinse rather than soak them and sprinkle often to keep moist. Sprouting time is rather short—2 to 4 days usually. Some people prefer their buckwheat sprouts no longer than the grain itself—1/4 to 1/2 inch—and others like a sprout 3/4 to 1 inch long. Buckwheat sprouts can be used in any recipe that calls for barley, millet, oat, rice or wheat sprouts, e.g., breads, cereals, main dishes and soups.

CABBAGE FAMILY—Broccoli, Brussels sprouts, Cabbage, Cauliflower, Collards and Kale. The cabbage family has almost as many relatives as the bean family. All are easy to sprout and each one produces a tasty sprout of a slightly different flavor. Not everyone likes every kind of sprout from the cabbage family, so experiment with a few seeds at a time. Sprouting time is 3 to 5 days for a sprouted length of 1/2 to 1 inch. One word of caution, these sprouts tend to become strong flavored or bitter if grown too long, so use them when they are most pleasant to

111 Which Sprouts for What

your taste in soups, salads and main dishes. Like their parent plants, they are high in vitamins and so are well worth sprouting.

CAULIFLOWER see CABBAGE FAMILY

CHIA. Chia seeds come from one of the family of sage plants and are not well known outside of Mexico and the American Southwest. Nor are they easy to sprout, being somewhat gluey so that they stick together when moist. However, aficionados rave about the slightly pungent taste they add to salads and sandwich spreads and point to their high trace-mineral content. So, if you are able to locate chia seeds and decide to try them, do so in moderation. But don't try to soak them; they will stick together in an unmanageable mass. Put the seeds on a saucer or small plate, sprinkle with water and let stand overnight. Another way is to put a small amount of water on a plate and float the seeds on top. Sprinkle again as the seeds dry out. Sprouting time is usually 1 or 2 days for 1/8-to 1/4-inch sprouts, which is the best length for most uses.

CHICKPEA. The chickpea, as it is called in the United States, is known by many names elsewhere in the world, garbanzo being one of the most common. The plant is highly drought resistant, which makes it ideal for growing in the subtropics, as well as the drier sections of Europe and North America. Nearly, although not quite, as high in protein as soybean sprouts, chickpea sprouts can be used in any dish that calls for the former. Chickpeas should also be sprouted the same way as soybeans—rinsing about 4 to 6 times in 24 hours because they tend to spoil quickly if left wet for any length of time without rinsing. Sprouting time is generally about 5 to 8 days and sprouted length about 1/2 to 1 inch.

CLOVER. The red clover seed is the one you want for sprouting. Handle it the same way as alfalfa and use it in the same kind of recipes; i.e., when the sprouts are just the length of the seed, they are best for appetizers, cereals and breads but when grown to 1-inch length and greened in sunlight use them in salads.

CORN. Untreated corn seed is almost never available, so two possibilities are open to the sprouter. Buy the whole field corn used for animal

Which Sprouts for What / 15

feed or raise your own sweet corn and let some of it mature for drying and later sprouting. The latter course will give you the best product. For sprouting, many people prefer the variety of corn known as Deaf Smith County but any sweet corn that you enjoy fresh will be palatable as sprouted corn. Try adding corn sprouts to soups or casseroles. Steam some and serve buttered as a side-dish vegetable. Oven-dried and finely ground corn sprouts may be used to replace part or all of the cornmeal in a quick-bread recipe. The possibilities are limited only by the inventiveness of the cook. Sprouting time can vary from 3 to 8 days, depending on the variety of seed used. Sprouted length should be 1/2 to 1 inch.

CRESS. A fast-growing plant with a peppery taste, its leaves are most often used in sandwiches or salads. Cress sprouts may be used in the same way but with moderation because of their pungency. Somewhat gluey like chia seeds, cress seeds should be sprouted the same way and harvested when the sprout is about 3/4 to 1 inch long, usually after 2 to 4 days.

FENUGREEK. This member of the legume family is almost unknown in the Western hemisphere but in the Far East it is used for seasoning, particularly in curry powder. The seeds sprout readily and in 3 or 4 days will reach 1/2-inch length, which is just about right to bring out Fenugreek's spicy flavor. Any longer in the sprouting process and the sprouts get bitter tasting.

FLAX. Flax is one of man's most helpful folk remedies for use in poultices and cough syrups, while the fiber is used to make linen. Flax seed is slightly gluey and should be sprouted like chia. Grown to 3/4- or 1-inch length—a length which usually takes 3 or 4 days of growing time—flax sprouts make a mild-flavored and delicate addition to salads and soups. If desired, they may be grown somewhat longer and greened in the sunlight for 3 or 4 hours to be used as you would any salad greens.

GARBANZO see **CHICKPEA**

LENTIL. One of the oldest vegetables known to man, lentils are mentioned in the Bible as the food for which Esau sold his birthright to Jacob. There are many different strains of lentil, ranging in color from green to yellow and redish brown. They sprout easily and even those

B2

Cooperative Extension Service

University of Illinois at Urbana-Champaign, College of Agriculture

Horticulture Facts

Growing Sprouts Indoors

James C. Schmidt
Department of Horticulture

VC-13-80
(Rev. 4/84)

①
②
③

Sprouting various kinds of seeds indoors for food purposes is a rather simple process, but one that does require a few minutes of time each day to assure success.

A sprout is the shoot of a germinated seed. Sprouts are a good source of protein, vitamins, and minerals. Sprouts are particularly rich in vitamins B₁, B₂, and C.

The most commonly used means of sprouting seeds is the "rinse and drain" method. In addition to the seeds, you need a glass jar and some cheesecloth. (A wide-mouth canning jar with a screw-top ring is ideal.) The seeds often used for sprouting include those of the mung bean, soybean, lentil, and alfalfa. When buying seeds for this purpose, get only those that are sold expressly for use in sprouting. Be sure they have not been treated with a fungicide or with any other material. Health food stores and the gourmet departments in supermarkets usually stock such seeds.

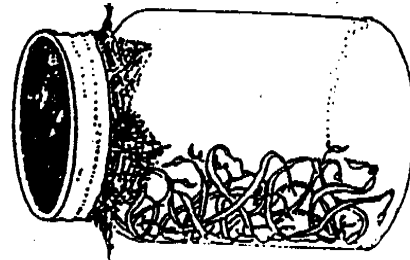


Figure 2

Sprouting the seeds is a 5-step process:

1. Prepare your sprouting jar by cleaning it thoroughly. Cover the bottom with 1/2 to 1 inch of seeds. Cover the mouth of the jar with a piece of cheesecloth. Secure it with a rubber band or a screw-top ring.
2. Rinse the seeds with cold water and drain them. The cheesecloth will keep the seeds in the jar as you pour off the water (Figure 1).
3. Soak the seeds in lukewarm water for 12 to 16 hours. The volume of water in the jar should be twice that occupied by the seeds.
4. Drain off the water. Then rinse the seeds with lukewarm water and drain them thoroughly.
5. Place the jar on its side to distribute the seeds evenly (Figure 2). Keep the jar in a dark place at room temperature (68° to 72°F is ideal).

Some people grow sprouts in the light. However, this allows them to turn green and possibly become tough and bitter.

Continue to rinse the seeds 2 to 4 times a day until the sprouts are the desired length, usually 2 to 5 days. Always be sure to drain off all excess water. Otherwise, the seeds will ferment and spoil.

The sprouts will be ready within a few days. Wash them thoroughly to remove the seed husks. Sprouts can be used in salads and on sandwiches, stir-fried, or cooked in vegetable dishes, soups, stews, and casseroles. Unused sprouts may be kept in a sealed bag or jar in the refrigerator for 1 to 2 weeks.

To freeze sprouts, blanch them over vigorous steam for 3 minutes, then cool quickly in ice water, drain, and pack the sprouts into containers that can be sealed.



Figure 1

Drawings by Floyd A. Giles, Department of Horticulture

State/County/Local Groups/U.S. Department of Agriculture Cooperative
The Illinois Cooperative Extension Service provides equal opportunities in programs and

2-H12

COOPERATIVE EXTENSION SERVICE

Sprouters' Guide--a list of suggested seeds that you can sprout and information regarding methods, yield, and use.

Seed	Desired sprout length	Average sprouting time	Sprout yield (for desired lengths) seeds used	Proper sprouting method	Can be eaten raw	Average cooking time
Adzuki	1/2 to 1 inch	4 to 5 days	1/4 cup	Soak and rinse	Yes	8 to 12 min
Alfalfa	Seed length	1 to 2 days	1 cup	Soak and rinse	Yes	3 to 5 min
Barley	Seed length	3 to 5 days	1/2 cup	Soak and rinse		8 to 10 min
Bean	1/2 to 1 1/2 inches	3 to 5 days	1/4 cup	Soak and rinse	Yes	8 to 15 min
Buckwheat	Seed length	2 to 4 days	1 cup	Rinse and sprinkle only		8 to 15 min
Cabbage, broccoli, Brussels sprout, cauliflower, and kale	1/2 to 1 inch	3 to 5 days	1/4 cup	Soak and rinse	Yes	3 to 2 min
Chia	1/8 to 1/2 inch	1 to 2 days	1/4 cup	Sprinkle only	Yes	
Chickpea or garbanzo	3/4 to 1 inch	5 to 8 days	1 cup	Soak and rinse 4 to 6 times a day	Yes/No	10 to 20 min
Cress	3/4 to 1 inch	2 to 4 days	1 tbsp.	Sprinkle only	Yes	
Fenugreek	1/2 inch	3 to 4 days	1/4 cup	Soak and rinse	Yes	2 to 4 min
Lentil	1/4 to 1/2 inch	3 to 4 days	1 cup	Soak and rinse	Yes	3 to 8 min
Millet	Seed length	3 to 5 days	1 cup	Soak and rinse		8 to 10 min
Mung bean	1/2 to 3 inches	3 to 8 days	1 cup	Soak and rinse	Yes	2 to 5 min
Oat	Seed length	3 to 5 days	1 cup	Sprinkle only		8 to 10 min
Pea	1/4 to 1/2 inch	3 to 4 days	1 cup	Soak and rinse		3 to 8 min
Radish ✓	1/2 to 1 inch	2 to 4 days	1 tbsp.	Soak and rinse	Yes	
Rice	Seed length	3 to 4 days	1 cup	Soak and rinse		8 to 10 min
Rye	Seed length	3 to 5 days	1 cup	Soak and rinse	Yes	3 to 5 min
Sesame	Budded only	2 to 3 days	1/4 cup	Soak and rinse		Oven roast
Soybean	3/4 to 1 inch	4 to 6 days	1 cup	Soak and rinse 4 to 6 times a day	Yes	10 to 20 min
Sunflower	Budded only	5 to 8 days	1 cup	Soak and rinse		Oven roast
Triticale	Seed length	1 to 3 days	1 cup	Soak and rinse	Yes	8 to 10 min
Wheat	Seed length	4 to 5 days	1 cup	Soak and rinse	Yes	8 to 10 min